

1       What is claimed:

2           1. An epicyclic cross piston engine comprising:

3               a #1 cylinder, a #2 cylinder, a #3 cylinder and a #4 cylinder and they each have a

4       cylindrical bore;

5               a #1 cylindrical piston, a #2 cylindrical piston, a #3 cylindrical piston and a #4 cylindrical

6       piston and they each have a top surface and a bottom end;

7               an elongated master connecting rod having a top end, a bottom end and a longitudinally

8       extending Y-axis;

9               first connection means connecting said top end of said master connecting rod to said

10      bottom end of said #1 cylindrical piston; said #1 cylindrical piston being telescopically received

11      in said bottom end of said #1 cylinder for reciprocal travel;

12               second connection means connecting said bottom end of said master connecting rod to

13      said bottom end of said #3 cylindrical piston; said #3 cylindrical piston being telescopically

14      received in said bottom end of said #3 cylinder for reciprocal travel;

15               an elongated secondary connecting rod having a front end, a rear end and a longitudinally

16       extending X-axis;

17               third connecting means connecting said top end of said secondary connecting rod to said

18      bottom end of said #2 cylindrical piston; said #2 cylindrical piston being telescopically received

19      in said bottom end of said #2 cylinder for reciprocal travel;

20               fourth connection means connecting said bottom end of said secondary connecting rod to

21      said bottom end of said #4 cylindrical piston; said #4 cylindrical piston being telescopically

1 received in said bottom end of said #4 cylinder for reciprocal travel;

2 an elongated output shaft having a front end, a rear end and a longitudinally extending Z-  
3 axis;

4 said Z-axis is oriented perpendicular to both said both X-axis and said Y-axis; said X-axis  
5 and said Y-axis lie in separate parallel planes perpendicular to said Z-axis and said separate  
6 parallel planes are longitudinally spaced from each other a predetermined distance J along said  
7 Z-axis; said X-axis and said Y-axis are oriented substantially ninety degrees to each other when  
8 looking along said Z-axis; and

9 drive train means connecting said master connecting rod and said secondary connecting  
10 rod to said output shaft that produces 360 degree rotation in said output shaft as a result of a  
11 complete reciprocal travel cycle of each of said pistons in their respective cylinders.

12 2. An epicyclic cross piston engine as recited in claim 1 wherein said drive train means  
13 comprises an elongated bellcrank coordinating arm connected between said secondary  
14 connecting rod and said master connecting rod.

15 3. An epicyclic cross piston engine as recited in claim 1 wherein said drive train means  
16 comprises a bellcrank output arm connected between said master connecting rod and said output  
17 shaft.

18 4. An epicyclic cross piston engine as recited in claim 3 wherein said drive train means  
19 further comprises a driveshaft link connected between said bellcrank output arm and said output  
20 shaft.

1           5. An epicyclic cross piston engine as recited in claim 2 wherein said secondary  
2         connecting rod has a transversely extending #1 bore hole having an A-axis located at a midlength  
3         point of said secondary connecting rod.

4           6. An epicyclic cross piston engine as recited in claim 5 wherein said drive train means  
5         further comprises a #1 connecting pin having a front end, a rear end and a longitudinal axis  
6         aligned with said A-axis; said front end of #1 connecting pin being journaled in said #1 bore hole  
7         of said secondary connecting rod.

8           7. An epicyclic cross piston engine as recited in claim 6 wherein said rear end of said #1  
9         pin is rigidly connected to said bellcrank coordinating arm.

10          8. An epicyclic cross piston engine as recited in claim 6 wherein said master connecting  
11         rod has a transversely extending #2 bore hole having a B-axis located at a midlength point of said  
12         bellcrank output arm.

13          9. An epicyclic cross piston engine as recited in claim 8 wherein said drive train means  
14         further comprises a #2 connecting pin having a front end, a rear end, and a longitudinal axis  
15         aligned with said B-axis; said #2 connecting pin being journaled in said #2 bore hole of said  
16         master connecting rod.

17          10. An epicyclic cross piston engine as recited in claim 9 wherein said drive train means  
18         further comprises a bellcrank output arm connected between said master connecting rod and said  
19         output shaft.

20          11. An epicyclic cross piston engine as recited in claim 10 wherein said front end of said  
21         #2 connecting pin is rigidly connected to said bellcrank coordinating arm.

1           12. An epicyclic cross piston engine as recited in claim 11 wherein said rear end of said  
2       #2 connecting pin is rigidly connected to said bellcrank output arm.

3           13. An epicyclic cross piston engine as recited in claim 12 wherein said B-axis is located  
4       a predetermined distance E from said A-axis.

5           14. An epicyclic cross piston engine as recited in claim 13 wherein said bellcrank output  
6       arm has a transversely extending #3 bore hole having a C-axis that is parallel to said B-axis and  
7       said distance between said B-axis and said C-axis is  $\frac{1}{2}$  E.

8           15. An epicyclic cross piston engine as recited in claim 14 wherein said drive train means  
9       further comprises a #3 connecting pin having a front end, a rear end and a longitudinal axis  
10      aligned with said C-axis; said front end of said #3 connecting pin being journaled in said #3 bore  
11      hole of said bellcrank output arm.

12          16. An epicyclic cross piston engine as recited in claim 15 wherein said drive train means  
13       further comprises an elongated driveshaft link and said rear end of said #3 connecting pin is  
14       rigidly connected to said driveshaft link.

15          17. An epicyclic cross piston engine as recited in claim 16 wherein said rear end of said  
16       output shaft is rigidly connected to said driveshaft link along said Z-axis.

17          18. An epicyclic cross piston engine as recited in claim 17 wherein the distance between  
18       said C-axis and said A-axis is F and F is equal to  $\frac{1}{2}$  E.

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